

What is claimed is:

1. A probe 4 contacting with an electrode of a test subject W1 formed on a substrate W and used for inspecting electrical characteristics of the test subject, the probe comprising:

a beam 4B having a leading end 4b1, an intermediate portion 4b2 and base end 4b3, the leading end being a portion for making a contact with the test subject via a contactor 4A, the base end being a portion for fixing the probe; and

a contactor 4A having a substantially trapezoidal shape and installed to the leading end 4b1 of the beam.

2. The probe of claim 1, wherein the trapezoidal shape of the contactor is a substantially square coned trapezoidal shape.

3. The probe of claim 1, wherein the beam 4B is bent toward the contactor 4A at the base end or the intermediate portion.

4. A method for manufacturing the probe 4 recited in claim 1 by using a lithography technology, comprising the steps of:

forming on a silicon substrate 10 a plurality of

recessed portions (frames) 10A, each having a substantially trapezoidal shape, by using an anisotropic etching technique, wherein an area of a top surface of the trapezoidal shape is controlled by adjusting an etching time; and

5        forming a plurality of probes 4, each being recited in claim 1, by using a film forming technique on the silicon substrate 10, wherein a contactor of each probe is formed inside each recessed portion 10A having the trapezoidal shape and at the same time the beam 4B is formed on the  
10        silicon substrate 2 together with the contactor 4A as a single body.

5.        The probe manufacturing method of claim 4, further comprising, after the step of forming the plurality of  
15        recessed portions 10A having the trapezoidal shape on the silicon substrate 2, the step of forming a peeling layer 402 at least on a portion of a surface of the silicon substrate 2 where the probes 4 are formed.

20        6.        A probe array used in a manufacturing process of a probe card, comprising:

          a second film-shaped supporting body 12; and  
          a plurality of probes, each being recited in claim 1,  
          adhered onto one surface of the second film-shaped  
25        supporting body.

7. The probe array of claim 6, wherein at least portions of said one surface of the second film-shaped supporting body where the probes are attached have an adhesive property, and an adhesive strength thereof can be varied by heat or  
5 ultraviolet light.

8. The probe array of claim 6, wherein a surface of each beam of the plurality of probes 4, a corresponding contactor being installed at the surface, is adhered to the surface of  
10 the second film-shaped supporting body having an adhesive property.

9. The probe array of claim 6, wherein the plurality of probes are arranged in various directions on a film.  
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10. A method for manufacturing the probe array recited in claim 6, comprising the steps of:

[a] forming the plurality of probes on the silicon substrate 10 by the manufacturing method of claim 4;

20 [b] transferring the plurality of probes formed on the silicon substrate 10 onto one surface of a first film-shaped supporting body 11 simultaneously;

[c] deteriorating an adhesive property of said one surface of the first film-shaped supporting body; and

25 [d] transferring the plurality of probes onto said one surface of the second film-shaped supporting body by

adhering the latter onto said one surface of the first film-shaped supporting body.

11. The method of claim 10, wherein said one surface of  
5 the first film-shaped supporting body 11 has the adhesive property and an adhesive strength thereof can be varied by heat or ultraviolet light.

12. The method of claim 10, wherein the step [a] includes  
10 the steps of:

[a'] forming a peeling layer on the silicon substrate prior to forming the plurality of probes on the silicon substrate by the method of claim 4; and

[b'] eliminating parts of the peeling layer prior to  
15 transferring the plurality of probes formed on the silicon substrate 10 onto said one surface of the first film-shaped supporting body simultaneously.

13. A method for attaching a base end of a probe to a  
20 supporting column 3 placed on a card shaped substrate 2, comprising the steps of:

installing the base end of the probe having the trapezoidal contactor of claim 1 and accommodated in the probe array of claim 6 on an attaching surface 3a of the  
25 supporting column 2 on the card shaped substrate 2; and

fixing the base end of the probe to the supporting

column.

14. The method of claim 13, wherein the step of fixing the base end of the probe to the supporting column is performed  
5 by pressing a leading end of an ultrasonic bonder against an upper side of the base end of the probe,

wherein the leading end of the ultrasonic bonder has a crossed protrusion, a cross section of the protrusion being of a substantially semicircle, and the beam of the probe is  
10 bent toward the contactor by fixing the base end of the probe to the supporting column by using the ultrasonic bonder.

15. An apparatus for attaching a base end of a probe  
15 having a trapezoidal contactor to a supporting column 3 of card shaped substrate 2, comprising:

a unit for installing the base end of the probe provided in a probe array of claim 6 to an upper portion of the supporting column of a substrate (103, 105, 101);

20 a unit for fixing the base end of the probe to the supporting column 106.

16. The attaching apparatus of claim 15, wherein the unit for fixing is an ultrasonic bonder having a leading end 106A  
25 equipped with a protrusion 106Aa.

17. The attaching apparatus of claim 16, wherein the protrusion at the leading end of the ultrasonic bonder substantially has a formation that semi-cylinder shaped protrusions are crossing each other.

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18. A probe card having a plurality of probes, comprising:

a probe card main body 2 including a first surface and a second surface, wherein a plurality of first terminals are installed on the first surface thereof, a plurality of  
10 second terminals 2b are installed on the second surface thereof, wherein each of the second terminals is connected to a different one of supporting columns 3 electrically and the first terminal is the supporting column 3; and

a plurality of probes 4 having substantially  
15 trapezoidal contactor of claim 1, wherein the base end 4b3 of each of probes is fixed to a different one of supporting columns 3.

19. The probe card of claim 18, wherein the contactor 4A  
20 of each probe substantially has a form of a square coned trapezoid.

20. The probe card of claim 18, wherein the probe is bent toward the contactor at a place between a base end and an  
25 intermediate portion thereof.

21. The probe card of claim 18, wherein the probe card main body further includes a stopper.

22. The probe card of claim 21, wherein the stopper is made of a same material as the supporting column and has an electric insulating film on a peripheral surface thereof including a contact surface with a surface of a test subject.

23. The probe card of claim 18, wherein the probe card main body 2 includes a plurality of alignment marks on the first surface thereof.

24. A probe array supporting unit 14 for supporting the probe array of claim 6 with a predetermined tension, comprising:

a first fixing part 14A, which is a first frame shaped structure;

a second fixing part 14B, wherein the second fixing part is a second frame shaped structure and overlapped with the first fixing part via the probe array of claim 6,

wherein while the second fixing part is overlapped with the first fixing part, the probe array is supported by both fixing parts under a predetermined tension; and

a locking part 14C for locking and fixing the overlapped first and second fixing parts.

25. A probe array supporting device of claim 24, wherein

the first fixing part is a first frame shaped structure having a first lower surface 14Aa and a first upper surface 14Ab and the first upper surface is a first slant surface declining from an outer circumference to an inner circumference of the first frame shaped structure; and

the second fixing part 14B is piled on the first fixing part and is a second frame shaped structure having a second lower surface and a second upper surface, and the second lower surface is a second slant surface declining from an outer circumference to an inner circumference of the second frame shaped structure and substantially having a same slant angle as that of the first slant surface.